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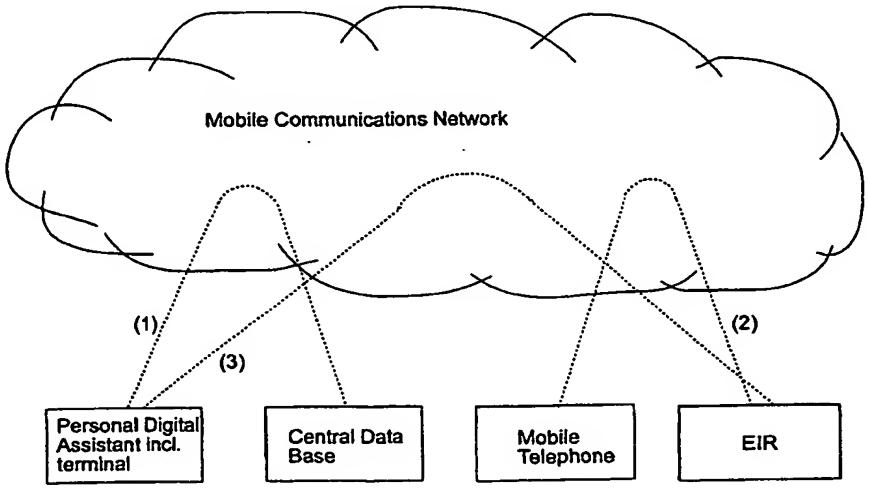

(57) Abstract

A Personal Digital Assistant is a portable computer that is so small that it can be held in the hand at use. Such Personal Digital Assistants will be extensively used both for data processing and registration, and by that data will be stored in the Personal Digital Assistant. In order to handle registered data, Personal Digital Assistants normally include functionality for setup to central computer via mobile telecommunications network. The present invention relates to a protection against theft of information from Personal Digital Assistants that have integrated functionality for mobile telecommunication. The Personal Digital Assistant is so adapted that it is not possible to activate without it connecting itself to the mobile telecommunications network. If the terminal is stolen and reported to central register for protection against theft, the terminal can lock itself against access to data, change to a state where it is unusable, and delete stored information according to specification. By that, the stored information will be inaccessible, even if the whole Personal Digital Assistant falls into wrong hands.

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TITLE OF THE INVENTION

Protection against theft for Personal Digital Assistant

TECHNICAL FIELD

A Personal Digital Assistant is a portable computer that is so small that it can be held in the hand at use. Personal Digital Assistants will be of extensive use both for data processing and registration and by that data will be stored in the Personal Digital Assistant or terminal. In order to protect these stored data against unauthorised access, the Personal Digital Assistant/terminal must be prepared in such a way that the risk of theft of the Personal Digital Assistant is limited.

The present invention relates to a system and a method to protect stored data if the computer yet would fall into wrong hands. The method and the system are applicable to Personal Digital Assistants/terminals that are equipped with terminal function for mobile communication. In the first place the invention deals with a terminal that is connected to a mobile packet switching data service such as GPRS.

PRIOR ART

At a performed patent situation investigation, the following documents have been found:

D1. JP,A, 8-272 742
D2. JP,A, 8-251 660
D3. JP,A, 7-193 865
D4. JP,A, 9-322 246

D5. JP,A, 8-317 467
D6. US,A, 5 600 708
D7. US,A, 5 659 594

The documents D2-D7 describes systems and devices the main aim of which are to prevent that a stolen mobile terminal is used, in order to in that way protect the rightful owner from costs caused by utilisation of the mobile terminal.

In documents D2 and D3 ways are described to protect use of a lost or stolen portable terminal, by that the owner, at detection of that the terminal is lost or stolen, can utilise the public telephone network and from a terminal initiate transmission of a signal to the lost terminal. The terminal that receives the signal will at that delete certain internal information, such as subscription information, which is important for the use of the terminal in the telecommunications network. By that is prevented that the stolen terminal can be used by unauthorised person.

Documents D4, D6 and D7 describes portable terminals, which are adapted with automatic procedures for check of that use is allowed by a check of a code or a list, which is transmitted from each base station. The terminal changes to the state "out of operation" if the code or list indicates that use is not allowed, for instance by checking of the IMEI-code.

There also are examples (document D5) of that a database is adapted to indicate the position of a lost portable terminal, which is in state of operation for use. If the terminal is stolen, use of the terminal also can be protected by breaking the setup in the mobile network.

Only one of the found documents, D1, describes a solution that is intended to protect a mobile terminal against disclosure of stored data. A portable terminal is adapted in a way that the owner, at detection that the terminal is lost or stolen, can utilise the public telephone network and from a telephone initiate encryption of stored information. When the encryption is finished, the information that has been stored in the terminal to perform the encryption is deleted.

None of the documents that have been found at the investigation includes explicitly, or in combination, the solution that is described in the present patent application.

TECHNICAL PROBLEM

A Personal Digital Assistant, which is utilised to register data will store great amounts of information. Among the stored information there may be both recently registered information and information that has been registered earlier, but has not yet been deleted, as well as basic data to facilitate the registration, application programs and other software. The Personal Digital Assistant therefore can hold information that are on different levels of secrecy and which it for different reasons is important to keep secret. In the Personal Digital Assistant built-in locks, such as keyboard locks and screen savers or mechanical access protection devices give a limited protection, but such locks can be broken/forced and in many cases there is a need for a more efficient protection against unauthorised access to stored data. This is especially important in connection with portable computers and Personal Digital Assistants, since the possibilities to disclose stored information are great because the computer

can be carried away and be thoroughly examined and also dismantled.

At business activity, information is registered that concerns the activity. The information can relate to i.a. size of stock, assortment of articles and price information, which information shall not be disclosed to competitors. Information also can relate to parts of, or basic data for offers, in which case neither the customer under any circumstances at all shall have access to the information.

At physician's round in hospital, previously registered information about patients is stored, such as identity information (for instance civic registration number), information about previous diseases, medicines to be taken, diagnosis and measured values. At the round, further information can be added. It is of outmost importance that such information is not accessible to unauthorised persons, primarily with regard to the patient's interests, but also in order to maintain the reputation of the care provider and to fulfil law requirements.

If information about an operators operation activities is made public, so that competitors will get information about, for instance, total capacity or at present available capacity, the current price situation can be influenced by the competition advantages that one of the parties can get by knowing information important for the operation. This is made especially evident in a firm of brokers or in exchange transactions, where often big business transactions are performed within a short period of time, and with current data as basic data information.

The user can use the Personal Digital Assistant as meeting calendar and take down meeting notes or make private or work related notes of delicate kind.

In addition to these examples Personal Digital Assistants will be used in a lot of other applications.

If an unauthorised person gets hold of the Personal Digital Assistant, one therefore will risk a great deal of harm if the Personal Digital Assistant is not adapted so that it is possible to prevent that the stored information is disclosed. A lock of type keyboard lock/window lock, or a mechanical lock, gives a limited protection against disclosure. A more efficient protection is achieved if stored data cannot be interpreted to usable information. To attain this there are two possibilities:

- Efficient encryption of stored information, completed with a good protection by means that causes decryption or other interpretation of the information.

- Deletion of stored information, the disclosure of which to unauthorised person results in harm.

One solution with utilisation of the first of the above mentioned possibilities is described above under "Prior Art", said document D1.

The invention according to the present patent application solves the problem of protecting the information according to the second of the two possibilities above.

TECHNICAL SOLUTION

A packet switching data service such as GPRS offers improved possibilities to create a protection for data stored in Personal Digital Assistants, which are equipped with terminal function for mobile communication.

A Personal Digital Assistant, which is equipped with integrated function for mobile communication, can be adapted so that it will not be possible to activate without it connecting itself to the mobile telecommunications network. If the terminal is stolen and reported to central register for protection against theft (EIR - Equipment Identification Register), the terminal can lock itself against access of data, change into a state where it is unusable, and delete certain stored information. By that, the stored information will be inaccessible, even if the whole Personal Digital Assistant will fall into wrong hands.

The Personal Digital Assistant in addition to that can be adapted so that register check via EIR is a condition for access to certain data. In the same way the information of the Personal Digital Assistant then will be protected if the terminal turns out to be reported as stolen.

ADVANTAGES

If the user has lost the Personal Digital Assistant and suspects that it has got into wrong hands, he/she can in a simple way initiate protection of the stored information. Immediately when the Personal Digital Assistant is activated, an automatic process will check whether the Personal Digital Assistant is registered as stolen. If this is the case, certain specified information will be deleted

and the Personal Digital Assistant is set in a state where it is unusable, before the user has possibility to interact with the Personal Digital Assistant. In that way, the information will have an efficient protection against disclosure. At the deletion, registered data that have not yet been transferred to central storing are lost. The amount of data that can be lost at deletion can be limited by data frequently being transferred to central storing, to avoid that backup has not been taken for large amounts of data. This is also important in order to protect registered data against loss caused by technical errors in the Personal Digital Assistant, or by disturbances/ interruptions.

In connection with deletion of data there is also possibility to delete stored programs and other routines so that misuse of licences (program copying) can be avoided.

If the program supplier has especially large demands of protection on the software, demands can be called for that the software is well protected against disclosure. In such cases the present invention gives a possibility to use programs, which otherwise are not allowed to be used in Personal Digital Assistants or other portable computers.

At the same time as the information protection is executed, the Personal Digital Assistant is set in a state making it considerable less usable, i.a. by that misuse of services that are connected to the Personal Digital Assistant, for instance services subscribed to in telecommunications networks, can be prevented. By that, the value for unauthorised use is reduced, resulting in that the Personal Digital Assistant at the same time becomes less liable to be stolen.

DESCRIPTION OF DRAWINGS

Figure 1 shows a block diagram for the communication procedure at activation of the Personal Digital Assistant.

Figure 2 shows activation of Personal Digital Assistant and activities in the Personal Digital Assistant in connection with blocking.

EXPLANATIONS OF TERMS

EIR	Equipment Identification Register. Register, for protection against theft, that stores serial numbers (IMEI) of stolen communication equipment for mobile telephony. By using the register, blocking of stolen equipment is made possible.
IMEI	International Mobile Equipment Identity. International serial number for communication equipment for mobile telephony. Each such communication equipment is by that uniquely identified.
GPRS	Generalised Packet Radio Service. Packet switching data service for GSM.
GSM	Global System for Mobile communication.
PDA	Personal Digital Assistant. Portable computer that is so small that it can be held in the hand at use.

DETAILED DESCRIPTION

The description below refers to the figures in the enclosed drawings.

THE PERSONAL DIGITAL ASSISTANT

Personal Digital Assistants are used in many different connections, such as by service and selling staff, in the transport sector, the industry and the retail trade. Common applications are reception and dispatching of goods, stock-taking and collecting according to orders. The Personal Digital Assistant also can include the user´s meeting calendar and meeting notes, as well as private or work related notes of delicate kind. Use of Personal Digital Assistants will be improved and they will be used in new fields. Example of possible new fields are within care/nursing, which make new demands on protection of the information.

With the Personal Digital Assistant, access to data will be faster, and the information that is registered will be more accurate than by use of conventional registration. Use of Personal Digital Assistant therefore will be both time and cost saving. The software for the Personal Digital Assistant can be tailored, but there are also standard programs for more simple routines.

At use of the Personal Digital Assistant, stored data about the object that are to be dealt with are used. Data is fed into and stored in the Personal Digital Assistant for later processing or storing in central systems. Transfer of data to central systems can be made by transmission via mobile telephony, which this invention is dealing with.

EQUIPMENT IDENTIFICATION REGISTER

A register for protection against theft, for instance EIR, over terminals for mobile telecommunication is managed by a trusted organisation.

The register includes a list over reported stolen/lost terminals that shall be protected against unauthorised use. Reported terminals are identified by the serial number IMEI.

THE IDEA OF THE INVENTION

The invention relates to a portable computer, which includes functionality for setup to central computer via mobile telecommunications network. The connection to the central computer is utilised, for instance, for transfer of data, which have been registered in the Personal Digital Assistant, or for reception of data or other information from the central computer. At connection to the telecommunications network, check (23) is made in register for protection against theft, whether the mobile telephone has been reported as stolen. If that is not the case, connection is made to the network, and the computer is started in normal operation.

The computer is so adapted that it in connection with activation (21) connects itself to the mobile telecommunications network (22) in a procedure that cannot be cut off/interrupted. In order to prevent unauthorised use of the Personal Digital Assistant, before the protection against theft comes into effect, the connection to the mobile telecommunications network is made before security protected functions and data in the Personal Digital Assistant are made accessible to the user. This

can, for instance, be achieved by the man-machine interface in the Personal Digital Assistant not being activated before the connection to the mobile telecommunications network is performed.

If the computer is stolen, or lost in another way, the loss is reported to the register for protection against theft by report of the identity of the terminal, for instance by report of IMEI, at which the terminal will be protected against use in the mobile telecommunications network.

The function "protection against theft" in the mobile telephone network means that if said check shows that a terminal, which requests connection to the telecommunications network, has been registered as stolen, the connection will not be made. The terminal also will be blocked.

In that way, a mobile telephone/Personal Digital Assistant, which has been registered as stolen, will, according to the invention, be prevented to connect itself to the mobile telecommunications network. At that, the terminal will change to protected state. This means that such data that have been stored in the Personal Digital Assistant and which have been judged to need secrecy protection, are deleted (24). The scope of the protection against theft is selected so that it corresponds to the needs, depending on the design of the computer and the need of protection for data that are handled. In certain applications of the Personal Digital Assistant, only fed in data are deleted, whereas in other applications also stored basic data, databases, programs and control sequences etc, are deleted. Encryption of certain, or all, data can be an alternative, or complement, to deletion of data.

In order to get a better continuity of the supervision against theft, check (23) in register for protection against theft whether the mobile telephone has been reported as stolen, also can be made on other occasions than at activation of the computer, for instance in connection with data transmission on the network, or after a stipulated period of time. Check (23) in register for protection against theft can also be initiated in connection with file access. At one in that way certified theft report, the Personal Digital Assistant will, in a corresponding way, be protected by i.a. deletion of stored data and blocking, as well as prevention, of transmission of data via the telecommunications network.

Performed deletion may be signalled over the mobile telecommunications network to instance with a supervising function for the Personal Digital Assistant. Such a supervising instance can be above mentioned central computer, or an alarm centre. After deletion, the computer changes to blocked state (25). Connection to the telecommunications network can be maintained as long as the computer is on, in order to facilitate localisation as a means to find the computer again.

In below described embodiments, the description is based on use of the packet switching data network GPRS. Alternatively other packet switching telecommunications networks can be utilised. The invention also can, under certain circumstances, be utilised at telecommunications networks without packet data switching.

PREFERRED EMBODIMENT

A Personal Digital Assistant intended to be used in a mobile way, for instance to register information such as

stocktaking, is equipped with an integrated GPRS-terminal. The computer is loaded with programs and data files necessary for the registration activity and has storing space for the data that shall be registered. The computer also has been equipped with functions for handling of the GPRS-terminal and functions for protection of stored data. The memory areas that will hold information that shall be protected against disclosure, shall be specified. If the functions for protection of stored data are activated, these specified data areas then will be protected against disclosure by deletion.

When the computer is activated, a connection to the GSM-network is made by a GPRS attach, and the GPRS-terminal will get into the state READY. In the GSM-network is checked whether the terminal/computer is registered as stolen by check of the IMEI of the terminal in EIR. If the terminal/Personal Digital Assistant is not reported as stolen, GPRS attach is performed and the GPRS-terminal will be accessible. After that, the terminal/Personal Digital Assistant is activated and an be used in intended way.

If the terminal/Personal Digital Assistant turns out to be reported as stolen, the Personal Digital Assistant will, via the GPRS-terminal, have a message to change to blocked state. At that, all man-machine communication will be blocked, and specified data areas will be deleted. At the same time connection to the GSM-network will be blocked, to prevent the GPRS-terminal from being used. This means that it is not possible to read data from the terminal, neither via keyboard and screen, nor via the GPRS-service. Because the data areas are deleted, where secret information can have been stored, all delicate data will be inaccessible, even if the Personal Digital Assistant is demounted.

ALTERNATIVE EMBODIMENTS

Some computers are located to environments and situations where it is difficult to create a satisfactory protection against theft. Examples of such situations are portable computers and computers located at public places or fairs. A computer that is expected to be subject to a bigger risk to be stolen is equipped with an integrated GPRS-terminal.

The computer is loaded with programs and data files necessary for the activity, and has storing capacity for data that shall be registered. Depending on demands of secrecy, the computer can be equipped with storing space that allows efficient deletion of memory content. The computer in addition has been equipped with functions for handling of the GPRS-terminal, and functions for protection of stored data.

When the computer is activated, an automatic connection is made to the GSM-network, and a check whether the terminal/computer is reported as stolen. If the terminal/computer turns out to be registered as stolen, the computer will, via GPRS, have a message to protect stored data and change to blocked state. Depending on the situation, different degrees of protection can be applied. The man-machine communication can be cut off, and selected memory areas can be deleted.

By means of a time supervision, the GPRS-terminal can detach, and immediately after that attach. An activated/switched on computer can in that way get an efficient protection against theft of data.

The same protection can be achieved by utilisation of other packet data switching telecommunication networks than GPRS, for instance UMTS.

By utilising text messages, the secrecy protection can work also in mobile telecommunications networks without packet data switching.

The invention is not limited to the above described embodiments, but may also be subject to modifications within the frame of the following patent claims and the idea of invention.

PATENT CLAIMS

1. A method for protection against theft of information that has been stored in portable computer with integrated terminal for mobile telecommunication, c h a r a c t e r i s e d in, that at connection to telecommunications network, check (23) is made in register for protection against theft whether said terminal, which is integrated in said computer, has been reported as stolen.

2. A method, as claimed in patent claim 1, c h a r a c t e r i s e d in, that said portable computer is adapted in a way that it, in connection with activation (21), connects itself to telecommunications network (22) for mobile telecommunication, before security protected functions and data, which have been stored in said computer, are made accessible to the user.

3. A method, as claimed in patent claim 1 or 2, c h a r a c t e r i s e d in, that if said check shows that said terminal, which requests connection to the telecommunications network, has been registered as stolen, the connection is not made.

4. A method, as claimed in any of the previous patent claims, c h a r a c t e r i s e d in, that the procedure for said connection to telecommunications network (22) cannot be interrupted/cut off without the computer becoming deactivated.

5. A method, as claimed in any of the previous patent claims, c h a r a c t e r i s e d in, that said check (23) in register for protection against theft can be initiated in connection with:

- file access,
- data transmission on the network,
- after a defined period of time, or
- according to any other criterion.

6. A method, as claimed in any of the previous patent claims, c h a r a c t e r i s e d in, that the terminal will be registered as stolen in the register for protection against theft when the person, who has at his/her disposal said computer with integrated terminal, no longer is possessed of the computer, for instance if the computer has been stolen.

7. A method as claimed in any of the previous patent claims, c h a r a c t e r i s e d in, that connection to said register for protection against theft is made by registration of the serial number of the terminal, for instance IMEI, and in that said register for protection against theft is EIR (Equipment Identification Register).

8. A method as claimed in any of the previous patent claims, c h a r a c t e r i s e d in, that if said check in register for protection against theft shows that said terminal has been registered as stolen,

- specified memory areas in the computer are deleted,
- use of the computer is blocked;
- the terminal function of the computer in the telecommunicationsnetwork is blocked.

9. A method as claimed in any of the previous patent claims, c h a r a c t e r i s e d in, that said specified memory areas hold, or can hold, data or programs the disclosure of which to unauthorised person can be harmful to the owner of the computer.

10. A method as claimed in any of the previous patent claims, c h a r a c t e r i s e d in, that said portable computer is a Personal Digital Assistant.

11. A method as claimed in any of the previous patent claims, c h a r a c t e r i s e d in, that packet switching data service in the telecommunications network is utilised by said integrated terminal for mobile telecommunication.

12. A method as claimed in any of the previous patent claims, c h a r a c t e r i s e d in, that said packet switching data service is GPRS.

13. A system for protection against theft of information that has been stored in a portable computer, which has integrated terminal, c h a r a c t e r i s e d in,

- that said portable computer is adapted in a way that it in connection with activation (21) connects itself to telecommunications network (22) for mobile telecommunication, before security protected functions and data in the Personal Digital Assistant are made accessible to the user, or the man-machine interface in the computer is activated, and

- that, at connection to the telecommunications network, check (23) is made in register for protection against theft if said terminal, which is integrated in said computer, has been reported as stolen, and

- that, if said terminal has been reported as stolen, communication on the telecommunications network is not accessible to the user.

14. A system as claimed in patent claim 13, c h a r a c t e r i s e d in, that the procedure for said connection to telecommunications network (22) cannot be interrupted/cut off without the portable computer becoming deactivated.

15. A system as claimed in any of the patent claims 13, or 14, c h a r a c t e r i s e d in that said check (23) in register for protection against theft can be initiated in connection with;

- file access,
- data transmission on the network,
- after a specified period of time, or
- according to another criterion.

16. A system as claimed in any of the patent claims 13 to 15, c h a r a c t e r i s e d in, that if said check in register for protection against theft shows that said terminal has been registered as stolen:

- such memory areas that hold, or can hold, data or programs, the disclosure of which to an unauthorised person may result in harm to the owner of said computer, are deleted;
- use of the computer is blocked, and

- the terminal function of the computer in the telecommunications network is blocked.

17. A system as claimed in any of the patent claims 13 to 16, c h a r a c t e r i s e d in, that said portable computer is a Personal Digital Assistant.

18. A system as claimed in any of the patent claims 13 to 17, c h a r a c t e r i s e d in, that packet switching data service in the telecommunications network is utilised by said terminal for mobile telecommunication, and in that said packet switching data service can be GPRS.

19. A system as claimed in any of the patent claims 13 to 18, c h a r a c t e r i s e d in, that said register for protection against theft is included in service for protection against theft, which is managed by trusted organisation, and in that connection and report regarding loss to said register for protection against theft is made by registration of the serial number of the terminal.

20. A system as claimed in any of the patent claims 13 to 19, c h a r a c t e r i s e d in, that the serial number of the terminal is IMEI, and said register for protection against theft is EIR.

21. A system as claimed in any of the patent claims 13 to 20, c h a r a c t e r i s e d in, that theft of the terminal is registered in the register for protection against theft when the person who has at his/her disposal said portable terminal with integrated terminal, no longer is possessed of the computer, for instance if the computer has been stolen.

22. Use of EIR at a terminal, which is adapted to mobile telecommunication, and which is integrated in Personal

Digital Assistant, the memory areas of which hold, or can hold, data or programs, the disclosure of which to an unauthorised person may result in harm to the owner of the computer, by at theft, or other loss of said terminal integrated in said Personal Digital Assistant, register the loss in order to, at activation of said Personal Digital Assistant but before security protected functions and data in the Personal Digital Assistant are made accessible to user, for instance by activation of the man-machine system, via packet switching data service in mobile telecommunications network, check whether registration exists that said terminal has been lost or been stolen and, at verification of such registration, protect specified in said Personal Digital Assistant stored data or programs against disclosure to unauthorised person by blocking connection of said terminal to the telecommunications network, delete specified memory areas in said Personal Digital Assistant, and block the use of the computer.

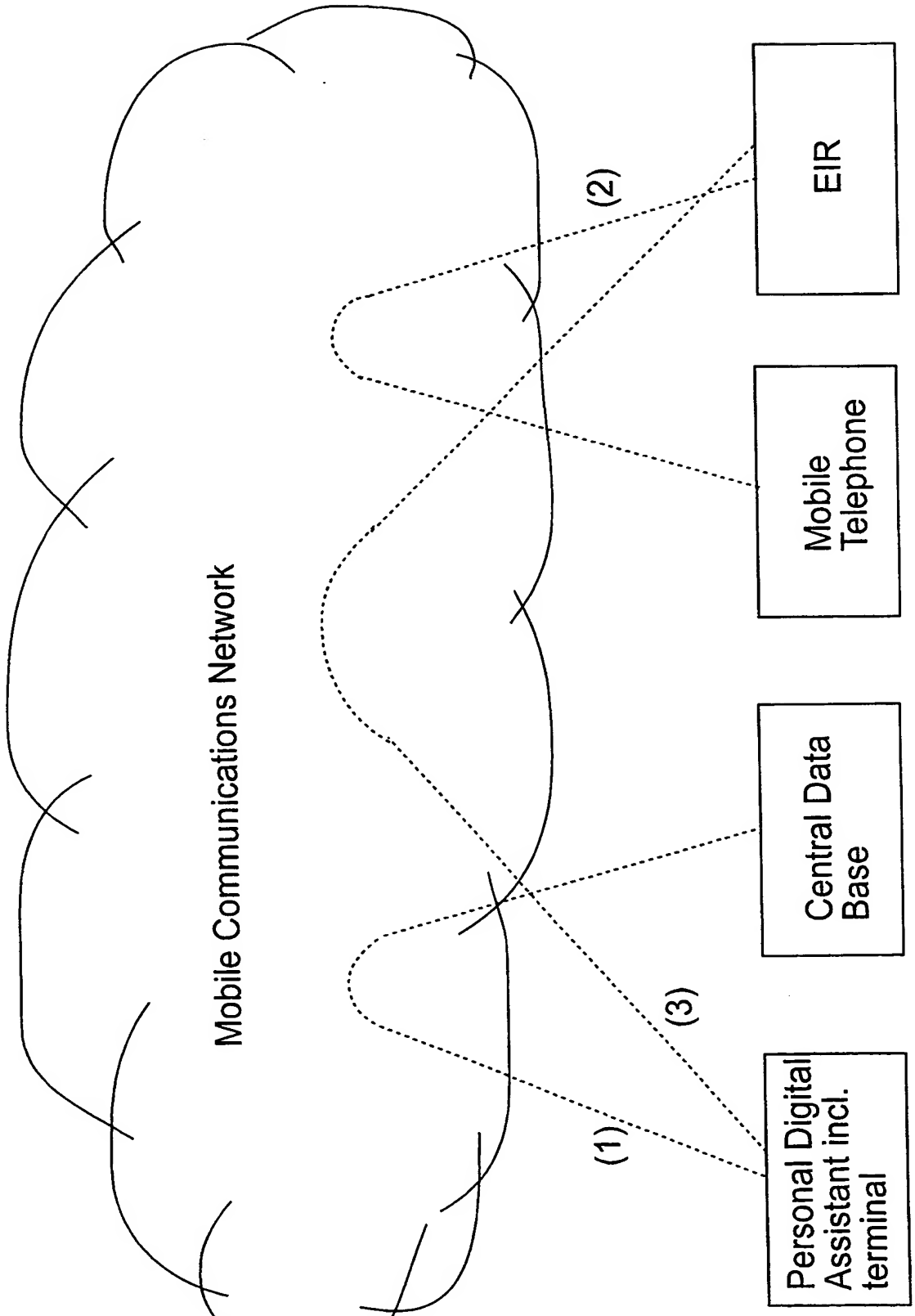

FIGURE 1

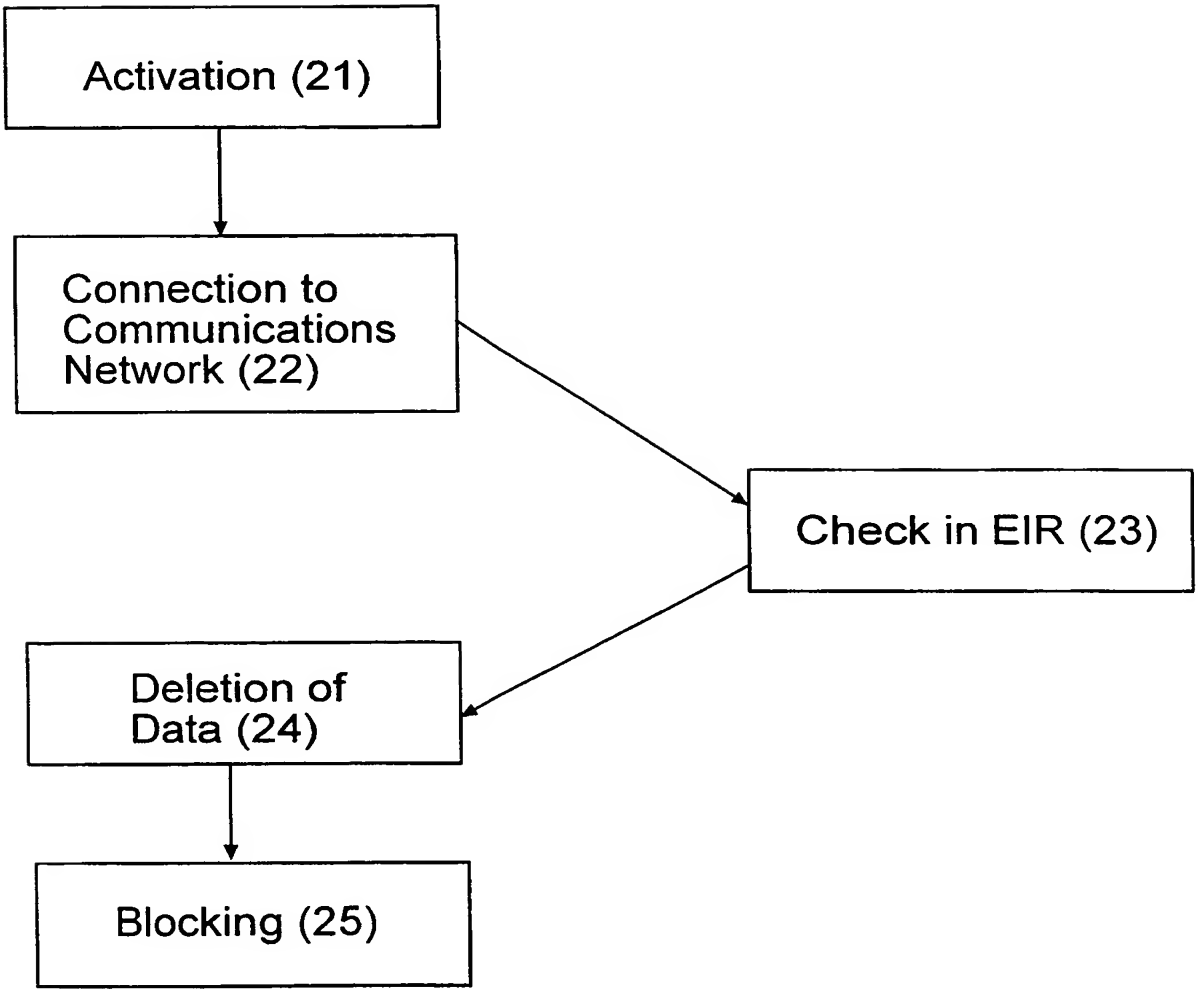

FIGURE 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 00/00175

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G06F 1/00, H04Q 7/38
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G06F, H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5659595 A (FREDERIC CHANU ET AL), 19 August 1997 (19.08.97), column 1, line 11 - line 32, claims 1,2	1,3,5,6,7, 9-12
Y		8
A		2,4,13-22
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Y	Patent Abstracts of Japan, abstract of JP 2-196532 A (MATSUSHITA ELECTRIC IND CO LTD), 3 August 1990 (03.08.90)	8
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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Information on patent family members

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